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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/822,647	04/13/2004	Chien-Hong Cheng	CHEN3657/EM	2982

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EXAMINER	
YAMNITZKY, MARIE ROSE	
ART UNIT	**PAPER NUMBER**
1774	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/14/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/822,647	CHENG ET AL.	
	Examiner	Art Unit	
	Marie R. Yamnitzky	1774	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 December 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7 and 9-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,9-25 and 27* is/are rejected.

7)☒ Claim(s) *26 and 28* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. This Office action is in response to applicant's amendment filed December 07, 2006, which amends claims 1-6, cancels claim 8 and adds claims 26-28.

Claims 1-7 and 9-28 are pending.

2. All prior art rejections set forth in the Office action mailed September 07, 2006 are overcome by applicant's amendment filed December 07, 2006.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 2, 4-7, 9-13, 16-18, 20, 21, 23-25 and 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Deaton et al. (US 2005/0123792 A1) or Lussier et al. (US 2005/0123795 A1).

The Deaton '792 and Lussier '795 publications individually teach the limitations of the rejected claims.

With respect to the limitations of the phosphorescent Ir complex of formula I or II as required by present claim 1 and further defined in present claims 2, 4-7 and 27, each publication anticipates a phosphorescent Ir complex of formula I or II wherein Z forms a nitrogen-containing

heterocyclic group that is not pyridine, quinoline or isoquinoline, R_1 is hydrogen or a substituent such as a C1-C6 alkyl or an aryl, R_2 is a C1-C6 alkyl such as methyl or an aryl such as phenyl, and R_3 is an aryl such as phenyl. The prior art complexes may be a complex of formula II wherein all ligands are the same, or a complex of formula I in which the X ligand is a monoanionic bidentate ligand such as acetylactetonate or salicylaldehyde. In particular, see paragraphs [0017]-[0040] in Deaton '792 and see paragraphs [0017]-[0038] in Lussier '795. While neither publication discloses a specific example of an Ir complex of present formula I or II, it is the examiner's position that one of ordinary skill in the art at the time of the invention would at once envisage such complexes given the specific teachings in each publication.

With respect to the limitations of present claim 9, see paragraphs [0067]-[0071], [0074] and [0183] in Deaton '792, and paragraphs [0063]-[0067], [0070] and [0179] in Lussier '795.

With respect to the limitations regarding a host compound as required by present claims 10-13, see paragraphs [0026]-[0027] and [0063]-[0065] in Deaton '792, and paragraphs [0036]-[0037] and [0059]-[0061] in Lussier '795. The specific compound required by claim 13 is named in paragraphs [0027] and [0064] of Deaton '792, and in paragraphs [0037] and [0060] of Lussier '795.

With respect to the limitations regarding a hole transporting layer as required by present claims 16 and 17, see paragraphs [0089]-[0138] in Deaton '792, and paragraphs [0085]-[0134] in Lussier '795. The specific compound required by claim 17 is named in paragraph [0116] of Deaton '792 and in paragraph [0112] of Lussier '795.

With respect to the limitations regarding a hole injection layer as required by present claim 18, see paragraphs [0087]-[0088] in Deaton '792, and paragraphs [0083]-[0084] in Lussier '795.

With respect to the limitations of a hole blocking layer as required by present claims 20, 21 and 23, see paragraphs [0028] and [0072]-[0073] in Deaton '792, and paragraphs [0038] and [0068]-[0069] in Lussier '795. The specific compound required by present claim 21 is named in paragraphs [0028] and [0073] of Deaton '792, as is the specific compound required by present claim 23, and these compounds are named in paragraphs [0038] and [0069] of Lussier '795.

With respect to the limitations of an electron transporting layer as required by present claims 24 and 25, see paragraphs [0179]-[0181] in Deaton '792, and paragraphs [0175]-[0177] in Lussier '795. The specific compound required by present claim 25 is a metal chelated oxinoid as taught in paragraph [0180] of Deaton '792 and paragraph [0176] of Lussier '795, is specifically named in paragraph [0153] of Deaton '792 and paragraph [0149] Lussier '795 with respect to oxinoid compounds satisfying prior art structural formula (E), and is used in the electron transporting layer of Deaton's device examples.

5. Claims 1-7, 9-13, 16-18, 20, 21, 23-25 and 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Deaton et al. (US 2005/0123798 A1).

The Deaton '798 publication teaches the limitations of the rejected claims.

With respect to the limitations of the phosphorescent Ir complex of formula I or II as required by present claim 1 and further defined in present claims 2-7 and 27, each publication

anticipates a phosphorescent Ir complex of formula I or II wherein Z forms a nitrogen-containing heterocyclic group that is not pyridine, quinoline or isoquinoline (such as indole as in Deaton's formula (1a)), R_1 is hydrogen or a substituent such as a C1-C6 alkyl or an aryl, R_2 is a C1-C6 alkyl such as methyl or an aryl such as phenyl, and R_3 is an aryl such as phenyl. The prior art complexes may be a complex of formula II wherein all ligands are the same, or a complex of formula I in which the X ligand is a monoanionic bidentate ligand such as acetylactetonate or salicylaldehyde. In particular, see paragraphs [0015]-[0030] and [0035]-[0041] and [0043]-[0061]. While the publication does not disclose a specific example of an Ir complex of present formula I or II, it is the examiner's position that one of ordinary skill in the art at the time of the invention could at once envisage such complexes given the specific teachings in the publication.

With respect to the limitations of present claim 9, see paragraphs [0073]-[0078], [0081] and [0190].

With respect to the limitations regarding a host compound as required by present claims 10-13, see paragraphs [0069]-[0072]. The specific compound required by claim 13 is named in paragraph [0071].

With respect to the limitations regarding a hole transporting layer as required by present claims 16 and 17, see paragraphs [0096]-[0145]. The specific compound required by claim 17 is named in paragraph [0123].

With respect to the limitations regarding a hole injection layer as required by present claim 18, see paragraphs [0094]-[0095].

With respect to the limitations of a hole blocking layer as required by present claims 20, 21 and 23, see paragraphs [0079]-[0080]. The specific compound required by present claim 21 is named in paragraph [0080], as is the specific compound required by present claim 23.

With respect to the limitations of an electron transporting layer as required by present claims 24 and 25, see paragraphs [0186]-[0188]. The specific compound required by present claim 25 is a metal chelated oxinoid as taught in paragraph [0187], is specifically named in paragraph [0160], and is used in the electron transporting layer of Deaton's device examples.

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 14, 15, 19 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Deaton et al. (US 2005/0123792 A1) or Lussier et al. (US 2005/0123795 A1) as applied to claims 1, 2, 4-7, 9-13, 16-18, 20, 21, 23-25 and 27 above, and further in view of Sato et al. (US 2002/0125818 A1).

The Deaton '792 and Lussier '795 publications do not disclose the specific hole transporting host compound required by claim 14, the specific electron transporting host compound required by claim 15, the hole injection modification layer required by claims 18 and 19, or the specific hole blocking compound required by claim 22, but the specific compounds

required by these claims are not novel, and multilayered device structures having various layers providing different functions were known in the art at the time of the invention.

For example, Sato et al. disclose a light emitting device in which the light emitting layer comprises a phosphorescent compound such as an iridium complex, the light emitting layer further comprising at least one host material having electron transporting capability or hole transporting capability.

Sato et al., as well as Deaton '792 and Lussier '795, teach that carbazole compounds may be used as the host material. Carbazole compounds such as the compound of claim 14 are known to have hole transporting capability. The compound of claim 14 is also a position isomer of m-(N-N'-dicarbazole)benzene, which is specifically taught as a host in Deaton '792 and Lussier '795.

Sato et al. also teach that TPBI (see paragraph [0127]) may be used as a host material. TPBI is the compound required by claims 15 and 22 and is known to have electron transporting capability.

Regarding the compound required by claim 19, Sato et al. disclose that aromatic amine compounds having a starburst structure may be used in a hole transporting layer. In paragraph [0173], Sato et al. name a specific starburst aromatic amine that is an isomer of the compound of present claim 19 (the compound of claim 19 being 4,4',4"-tris(2-naphthylphenylamino) triphenylamine). Multi-layered hole injecting/transporting structures were known in the art at the time of the invention, with materials of different ionization potentials and hole mobilities

being selected for different layers and arranged so as to provide a flow of holes from the anode to the light emitting layer.

With respect to the use of TPBI in the hole blocking layer as in claim 22, TPBI is a known electron transporting compound and it was known in the art at the time of the invention that the ability of an electron transporting compound to block holes is dependent, at least in part, on the composition of the adjacent light emitting layer.

The specific compounds required by present claims 14, 15, 19 and 22 are not novel compounds. It is the examiner's position that absent a showing of superior/unexpected results, it would have been within the level of ordinary skill of a worker in the art at the time of the invention to select suitable alternative materials for use as a host material in the light emitting layer, a material for the hole injecting/transporting layer, and a material for the hole blocking layer of a device according to Deaton '792 or Lussier '795 from known materials such as those disclosed by Sato et al. and similar known materials.

8. Claims 14, 15, 19 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Deaton et al. (US 2005/0123798 A1) as applied to claims 1-7, 9-13, 16-18, 20, 21, 23-25 and 27 above, and further in view of Sato et al. (US 2002/0125818 A1) .

Deaton et al. do not disclose the specific hole transporting host compound required by claim 14, the specific electron transporting host compound required by claim 15, the hole injection modification layer required by claims 18 and 19, or the specific hole blocking compound required by claim 22, but the specific compounds required by these claims are not

novel, and multilayered device structures having various layers providing different functions were known in the art at the time of the invention.

For example, Sato et al. disclose a light emitting device in which the light emitting layer comprises a phosphorescent compound such as an iridium complex, the light emitting layer further comprising at least one host material having electron transporting capability or hole transporting capability.

Sato et al., as well as Deaton '798, teach that carbazole compounds may be used as the host material. Carbazole compounds such as the compound of claim 14 are known to have hole transporting capability. The compound of claim 14 is also a position isomer of m-(N-N'-dicarbazole)benzene, which is specifically taught as a host in Deaton '798.

Sato et al. also teach that TPBI (see paragraph [0127]) may be used as a host material. TPBI is the compound required by claims 15 and 22 and is known to have electron transporting capability.

Regarding the compound required by claim 19, Sato et al. disclose that aromatic amine compounds having a starburst structure may be used in a hole transporting layer. In paragraph [0173], Sato et al. name a specific starburst aromatic amine that is an isomer of the compound of present claim 19 (the compound of claim 19 being 4,4',4"-tris(2-naphthylphenylamino) triphenylamine). Multi-layered hole injecting/transporting structures were known in the art at the time of the invention, with materials of different ionization potentials and hole mobilities being selected for different layers and arranged so as to provide a flow of holes from the anode to the light emitting layer.

With respect to the use of TPBI in the hole blocking layer as in claim 22, TPBI is a known electron transporting compound and it was known in the art at the time of the invention that the ability of an electron transporting compound to block holes is dependent, at least in part, on the composition of the adjacent light emitting layer.

The specific compounds required by present claims 14, 15, 19 and 22 are not novel compounds. It is the examiner's position that absent a showing of superior/unexpected results, it would have been within the level of ordinary skill of a worker in the art at the time of the invention to select suitable alternative materials for use as a host material in the light emitting layer, a material for the hole injecting/transporting layer, and a material for the hole blocking layer of Deaton's device from known materials such as those disclosed by Sato et al. and similar known materials.

9. Miscellaneous:

In the last two lines of claim 1, the examiner suggests that the proviso be set forth in a separate line since it pertains to Z rather than to R_3.

In line 2 of claim 6, "structures" should read --structure--.

Each of claims 13-15, 17, 19, 22, 25 and 28 is lacking a period at the end of the claim.

10. Claims 26 and 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art does not disclose or suggest an OLED in which a light emitting layer comprises a phosphorescent Ir complex of formula I or II wherein the nitrogen-containing heterocyclic group formed by Z is benzothiazole as claimed in present claim 26, such as the specific Ir complex as claimed in present claim 28.

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 7:00 a.m. to 3:30 p.m. Monday-Friday.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

MRY
March 12, 2007

Marie R. Yamnitzky

MARIE YAMNITZKY
PRIMARY EXAMINER

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